

## CLAIMS

### I CLAIM:

1. A compaction unit for compressing block-making material, said unit comprising:
  - a. a ramming chamber comprised of an elongated open ended chamber having a longitudinal bore, a compression end, a fill port opening located upon said compression end for enabling a block-making material to enter into said ramming chamber, an extrusion end, and
  - b. a ramming head that fits closely within said compression end of said ramming chamber, whereby said ramming head can push said block-making material along said longitudinal bore of said ramming chamber, and
  - c. a continuous homogeneous block comprised of said block-making material that has been previously compacted and advanced along said longitudinal bore of said ramming chamber, said block remains within and fills said extrusion end of said ramming chamber to provide a blockage that has a frictional threshold or resistance to movement, whereby said block functions as a tailgate so as to enable a new lift to be compressed between said block and said ramming head, and
  - d. an actuator means for providing force to said ramming head, thereby enabling said ramming head to move along said longitudinal bore of said ramming chamber, said actuator means comprised of a hydraulic cylinder rigidly coupled to said compression end of said ramming chamber, said hydraulic cylinder having a hydraulic piston rod coupled to said ramming head, whereby force and motion provided by said hydraulic cylinder causes said block-making material located within said compression end of said ramming chamber to be compressed between said ramming head and said continuous homogeneous block, whereby a new compacted lift is formed and combines with all previously compacted lifts to extend said continuous homogeneous block from the extrusion end of said ramming chamber.

2. A compaction unit of claim 1 further comprising a bulk storage means wherein a hopper is coupled to said fill port, thereby allowing for bulk storage of said block-making material within said hopper until needed for use within said ramming chamber.
3. A compaction unit of claim 1 further comprising a block cutting means wherein a shearing chamber having essentially the same internal cross-sectional dimension of said ramming chamber but with much shorter bore length, said shearing chamber also comprised of an input end, and an output end, said input end of said shearing chamber is rigidly attached by an alignment structure means, said alignment structure means comprised of a sliding mechanism that rigidly supports said shearing chamber in near perfect alignment with said longitudinal bore of said ramming chamber while allowing said shearing chamber to move only along the vertical plane, an actuator means wherein a low profile hydraulic cylinder is attached to the bottom of said extrusion end of said ramming chamber, wherein said low profile hydraulic cylinder provides force and motion to a lever/fulcrum mechanism that transfers said force and motion to said shearing chamber, whereby said continuous homogenous block exiting said ramming chamber immediately enters into said shearing chamber, and when said low profile hydraulic cylinder is activated forces said shearing structure to fracture said continuous homogeneous block along said vertical plane of movement between said ramming chamber and said shearing chamber, thereby allowing infinitely variable yet controllable block length.
4. A compaction unit of claim 3 further comprising a support platform means wherein a roller based support platform is attached to said output end of said shearing chamber so that as said shearing chamber goes through its shearing motion said support platform moves with said shearing chamber, whereby said continuous homogeneous block being sheared is constantly supported during the shearing cycle and does not break or fracture at any point other

than the desired location, thereby allowing blocks of any practical length to be assembled and stored upon said support platform.

5. A compaction unit of claim 1 wherein said ramming head has a frictional threshold increasing means wherein a wedge shaped feature is located on the face of said ramming head, said wedge shaped feature contacts said block-making material enabling a portion of a compaction force to be directed towards an inner wall of said ramming chamber, thereby increasing the frictional threshold or resistance to movement of said block-making material located within said extrusion end of said ramming chamber, whereby the overall length of said extrusion end of said ramming chamber can be reduced and still produce high-density blocks.
6. A compaction unit of claim 1 further comprised of a transportable means wherein a carrier base having rotatable means comprised of at least one wheel mounted thereunder, thereby enabling said compaction unit to be moved to and around a job site.
7. A transportable means of Claim 6 further comprised of a self-propelling means wherein an engine mounted on said carrier base produces rotational energy, said engine having means for controllably coupling said rotational energy to said at least one wheel so as to propel said carrier base along a surface.
8. A block-ramming machine further comprised of at least two compaction units of claim 1 mounted on a single trailer for easy transport, said block-ramming machine further comprised of a single power source means wherein a large diesel engine with multiple hydraulic pumps attached provides all necessary hydraulic pressure and flow to said at least two compaction units.

9. A unit of claim 1 further comprised of a production control means wherein a microprocessor with associated devices is enabled to completely control the compaction cycle and actuator system, thereby allowing full control of the production schedule and output of said unit.
10. A block-ramming machine for making blocks with block making material, said machine comprising:
- a. a ramming chamber comprised of an elongated open ended chamber having a longitudinal bore, a compression end, a fill port opening located upon said compression end for enabling a block-making material to enter into said ramming chamber, an extrusion end, and
  - b. a ramming head that fits closely within said compression end of said ramming chamber, whereby said ramming head can push said block-making material along said longitudinal bore of said ramming chamber, and
  - c. a continuous homogeneous block comprised of said block-making material that has been previously compacted and advanced along said longitudinal bore of said ramming chamber, said block remains within and fills said extrusion end of said ramming chamber to provide a blockage that has a frictional threshold or resistance to movement, whereby said block functions as a tailgate so as to enable a new lift to be compressed between said block and said ramming head, and
  - d. an actuator means for providing force to said ramming head, thereby enabling said ramming head to move along said longitudinal bore of said ramming chamber, said actuator means comprised of a hydraulic cylinder rigidly coupled to said compression end of said ramming chamber, said hydraulic cylinder having a hydraulic piston rod coupled to said ramming head, whereby force and motion provided by said hydraulic cylinder causes

said block-making material located within said compression end of said ramming chamber to be compressed between said ramming head and said continuous homogeneous block, wherein a new compacted lift is formed and combines with all previously compacted lifts to extend said continuous homogeneous block from within said ramming chamber.

- e. a bulk storage means wherein a hopper coupled to said fill port, thereby allowing for the bulk storage of said block-making material within said hopper until needed for use within said ramming chamber, and
- f. a block cutting means wherein a shearing chamber having essentially the same internal cross-sectional dimension of said ramming chamber but with a much shorter bore length, said shearing chamber also comprised of an input end, and an output end, said input end of said shearing chamber is rigidly attached by an alignment structure means, said alignment structure means comprised of a sliding mechanism that rigidly supports said shearing chamber in near perfect alignment with said longitudinal bore of said ramming chamber while allowing said shearing chamber to move along the vertical plane, an actuator means wherein a low profile hydraulic cylinder is attached to the bottom of said extrusion end of said ramming chamber, wherein said low profile hydraulic cylinder provides force and motion to a lever/fulcrum mechanism that transfers said force and motion to said shearing chamber, whereby said continuous homogenous block exiting said ramming chamber immediately enters into said shearing chamber, and when said low profile hydraulic cylinder is activated forces said shearing structure to fracture said continuous homogeneous block along said vertical plane of movement between said ramming chamber and said shearing chamber, thereby allowing infinitely variable yet controllable block length.
- g. a support structure means wherein a roller based support platform is attached to said shearing chamber so that as said shearing chamber goes through its shearing cycle, said support platform moves with said shearing

chamber, whereby said continuous homogeneous block being sheared is constantly supported during the shearing cycle and does not break or fracture at any point other than the desired location, thereby allowing blocks of any practical length to be assembled and stored upon said support platform.

11. A block-ramming machine of claim 10 further comprising a transportable means wherein a carrier base having rotatable means comprised of a at least one wheel mounted thereunder, thereby enabling said block-ramming machine to be moved to and around a job site.
12. A block-ramming machine of claim 11 further comprised of a self-propelling means wherein an engine provides rotational energy controllably coupled to said at least one wheel thereby enabling said block-ramming machine to be propelled around a job site.
13. A block-ramming machine of claim 10 further comprised of an operational control means wherein a microprocessor with associated sensor and control devices is enabled to control all operational parameters of said compaction unit, whereby complete control of all aspects of block production, production scheduling, engine performance parameters and maintenance can be achieved.

14. A process that modernizes CEB and SCEB construction technology comprised of steps:

- a. a mechanical equipment means wherein a track excavator provides all the power and movement required to lift, maneuver, align, and place a relatively large CEB block within a building system, and
- b. a lifting means wherein a rotating clamshell grapple is modified by adding two lifting arms, said lifting arms gently grip and support the sides of said block to enable hoisting of said block, said grapple is directly coupled to said excavator, whereby said excavator provides a source of hydraulic power to fully operate all functions of said grapple, and
- c. a controlled placement means wherein an operator of said excavator maneuvers said excavator and attached said grapple into position, said grapple is lowered over said relatively large CEB block, said operator closes said grapple causing said lifting arms to firmly engage and support the sides of said block, said excavator then provides the force and motion to hoist and maneuver said block within a building system, said hydraulic power is then reversed to said grapple to release said block into place within said building system, thereby modernizing CEB and SCEB construction technology by enabling mechanical power to replace human labor as the dominant power source utilized to maneuver and place the majority of the mass within a CEB and SCEB construction project.